

Claims

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A back-up steering system for a track laying vehicle comprising:
 - a source of fluid pressure;
 - a mode control valve;
 - a main solenoid valve connected to the source of fluid pressure and the mode control valve;
 - a pair of back-up solenoid valves each connected to the mode control valve and the source of fluid pressure; and,
 - left and right service brakes connected to the mode control valve;wherein during normal operation the mode control valve is set so that the service brakes are in fluid communication with the mode control valve and the main solenoid valve so that when the main solenoid valve is actuated the source of fluid pressure is in fluid communication with both service brakes for simultaneous actuation thereof in response to operator induced braking, and during back-up or emergency operation the mode control valve is set such that the service brakes are in fluid communication with the mode control valve and the back-up solenoid valves so that the left and right service brakes are selectively brought into fluid communication with the source of fluid pressure via selective actuation of the back-up solenoid valves whereby the vehicle can be steered even though the primary steering system is not functioning properly.
2. A back-up steering system for a track laying vehicle as described in claim 1 wherein the source of fluid pressure is a hydraulic pump.
3. A back-up steering system for a track laying vehicle as described in claim 1 wherein the source of fluid pressure is an accumulator.

4. A back-up steering system for a track laying vehicle as described in claim 1 wherein the source of fluid pressure is a hydraulic pump and an accumulator.
5. A back-up steering system for a track laying vehicle as described in claim 4 wherein the system further includes a check valve connected between the hydraulic pump and the accumulator.
6. A back-up steering system for a track laying vehicle as described in claim 5 wherein the accumulator is isolated from the hydraulic pump and the main solenoid valve by the check valve.
7. A back-up steering system for a track laying vehicle as described in claim 1 wherein the main solenoid valve is connected to a common fluid sump.
8. A back-up steering system for a track laying vehicle as described in claim 1 wherein the back-up solenoid valves are each connected to the common fluid sump.
9. A back-up steering system for a track laying vehicle as described in claim 7 wherein when not actuated the main solenoid valve is positioned such that the mode control valve is in fluid communication with the fluid sump so that fluid is recirculated through the system.
10. A back-up steering system for a track laying vehicle as described in claim 8 wherein when the back-up solenoid valves are not actuated they are connected to the common fluid sump.
11. A back-up steering system for a track laying vehicle as described in claim 1 wherein the mode control valve, the main solenoid valve, and the back-up solenoid valves are all electronically actuated.

12. A back-up steering system for a track laying vehicle as described in claim 1 wherein the mode control valve is hydro-mechanically actuated and the main solenoid valve and the back-up solenoid valves are electronically actuated.
13. A back-up steering system for a track laying vehicle as described in claim 12 wherein the mode control valve is actuated in response to hydraulic signals so as to change from normal mode to back up mode automatically.
14. A back-up steering system for a track laying vehicle as described in claim 11 wherein the mode control valve can be actuated in response to signals from appropriate sensors for detecting a failure of the primary steering system, thus making a mode change automatically.
15. A back-up steering system for a track laying vehicle as described in claim 1 wherein the back-up solenoids are linked to an steering input device so that back-up or emergency steering can be accomplished in a normal way.
16. A back-up steering system for a track laying vehicle as described in claim 1 wherein the back-up solenoid valves are linked to individual brake pedals.
17. A back-up steering system for a track laying vehicle as described in claim 15 wherein the main solenoid valve is linked to an braking input device so that braking during normal operation is accomplished in a normal way.
18. A back-up steering system for a track laying vehicle as described in claim 17 wherein the back-up solenoid valves are linked to both the steering input device and the braking input device so that the service brakes are individually applied in response to a steering input and simultaneously applied during a braking input.

19. A back-up steering system for a track laying vehicle as described in claim 17 wherein the mode control valve is linked to the braking input device so that the main solenoid is brought into communication with the service brakes in response to a braking input.

20. A back-up steering system for a track laying vehicle as described in claim 11 wherein electrical input to the various valves of the system is provided under normal conditions by a vehicle alternator and in the event of alternator failure the valves are powered by a vehicle battery.

21. A back-up steering system for a track laying vehicle as described in claim 4 wherein hydraulic fluid pressure is provided under normal conditions by the hydraulic pump and in the event of pump failure the accumulator provides fluid pressure to the system.